



**epidemic  
marketplace**

# **WP3 – Information Platform Report Epiwork Final Review**

**Torino 13<sup>th</sup> September, 2013**

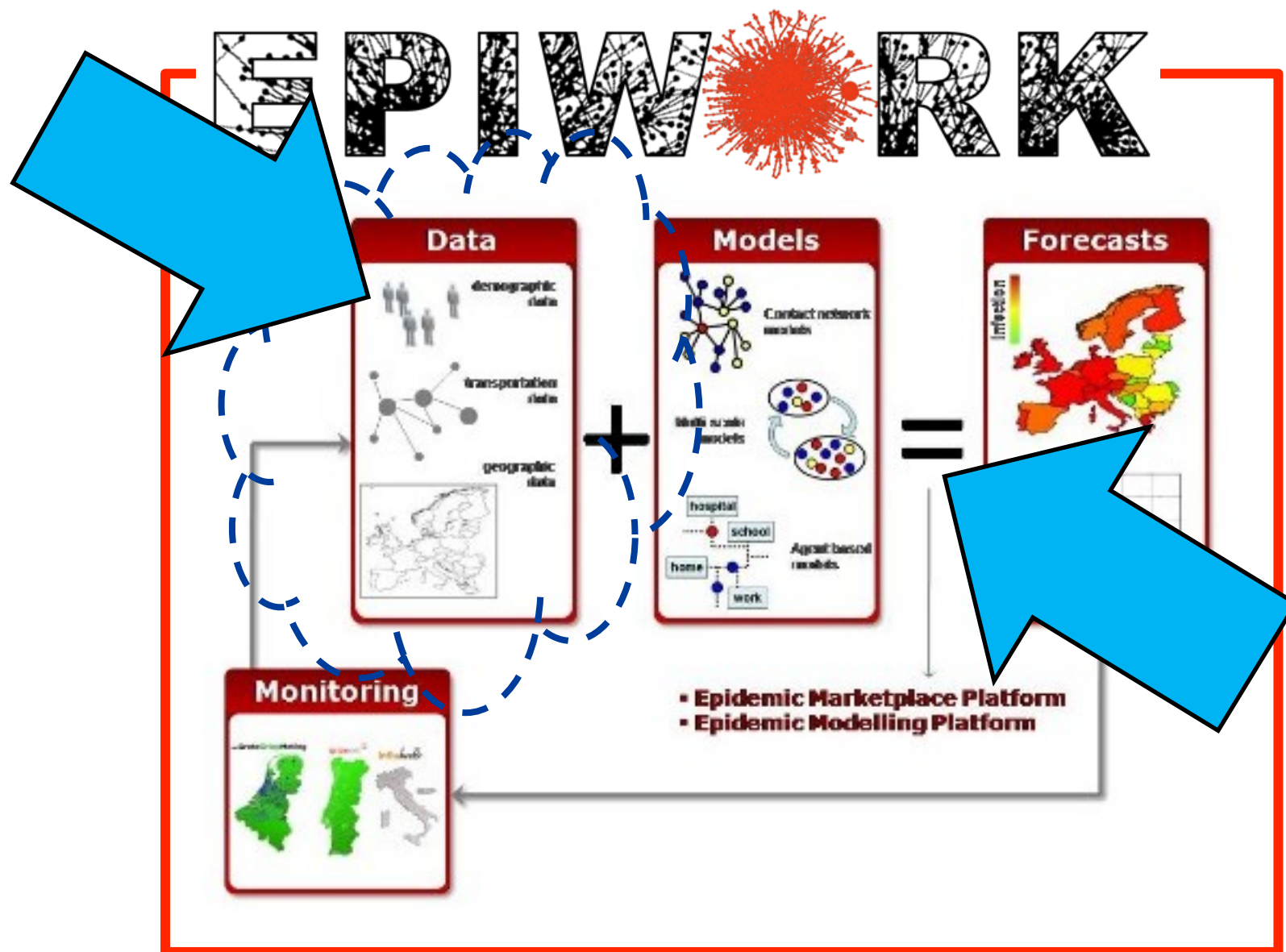
**Mário J. Silva**

**mjs@inesc-id.pt**



**UNIVERSIDADE  
DE LISBOA**

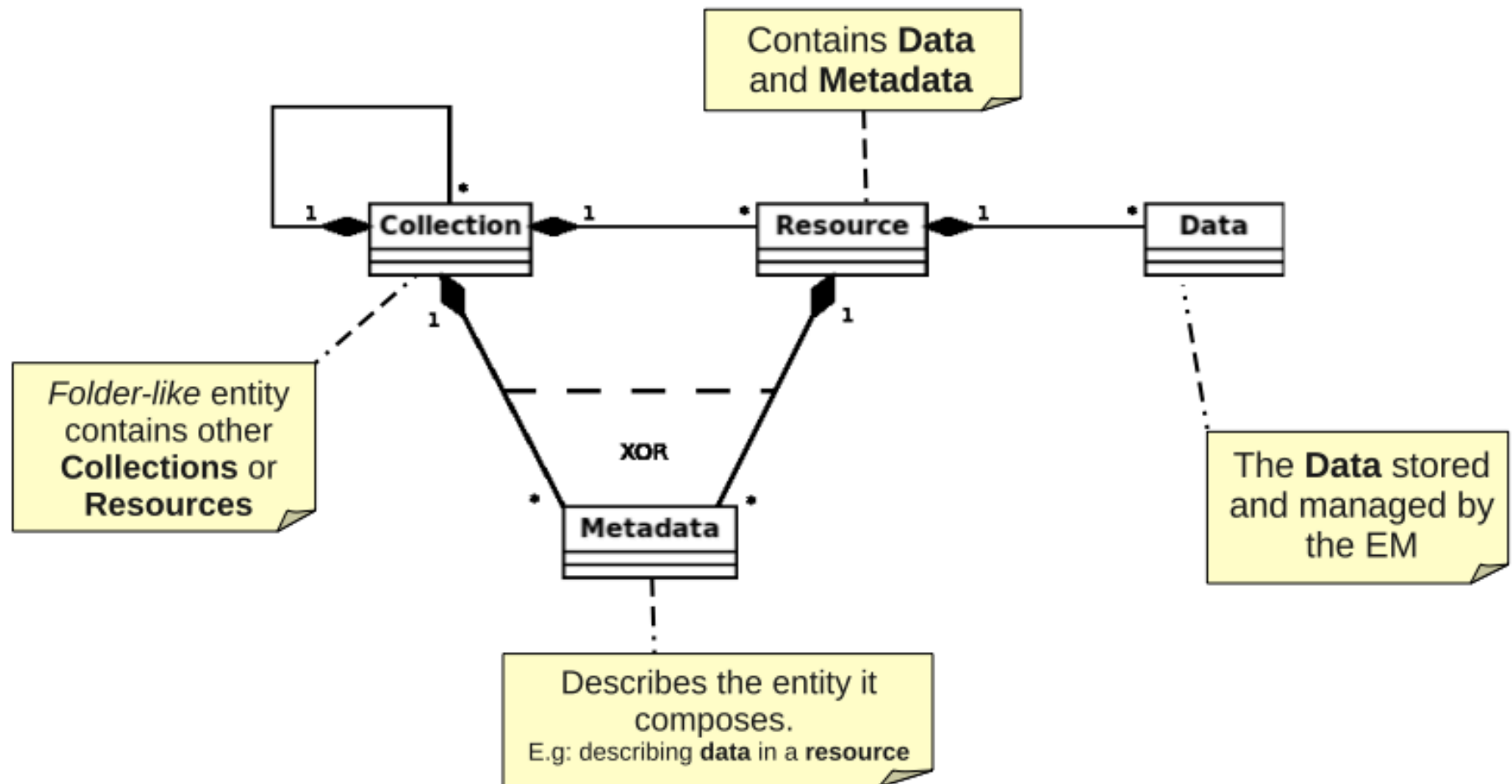




# Epidemic Marketplace (EM)

1. **Catalogue of data sources** containing the metadata describing existing databases;
2. **Forum** to
  - publish information about data
  - seek modelers to collaborate with,
  - seek sources of data that could be of interest to their epidemiological modeling efforts;
3. **Mediating software** to automatically process queries to epidemiological data, harvest data, assemble datasets....

# Conceptual Model of the EM Repository



# Timeline of EM Releases

Date	Release	Event	Documents
Nov 2011	V1.0	(CO) Epiwork Meeting	D3.3
Jan 2012	V2.0	(PU) @ 1 <sup>st</sup> Epiwork Workshop	D3.4
May 2013	V3.0	@ 2 <sup>nd</sup> Epiwork Workshop	D3.6 (jul 2013)


[Home](#)

## Resource Metadata

Meta-data	
<b>Title</b>	Twitter dataset H1N1 + Portugal 4-6-2009
<b>Creator</b>	<a href="#">LASIGE node of the Epidemic Marketplace</a>
<b>Subject</b>	twitter message dataset
<b>Description</b>	<p>This dataset contains Twitter messages containing the words H1N1 and Portugal collected between 16-5-2009 and 3-6-2009, Information is a 7 columns relation, containing the following data:</p> <p>Column 1- keyword 1 (disease)- H1N1            Column 2- Keyword 2 (location)- Portugal            Column 3- Source (Twitter)            Column 4- Author of the message (user id)            Column 5- The message body (evidence)            Column 6- score            Column 7- date (day and hour)</p>
<b>Publisher</b>	Epiwork – <a href="http://www.epiwork.eu">http://www.epiwork.eu</a>
<b>Format</b>	text/tab-separated-values
<b>Language</b>	English, Portuguese
<b>Contributor</b>	Luis F Lopes, Joao M Zamite, Bruno C Tavares, Francisco M Couto, Fabricio Silva, Mario J Silva
<b>Relation</b>	Luis F. Lopes, João M. Zamite, Bruno C. Tavares, Francisco M. Couto, Fabrício Silva and Mário J Silva (2009). Automated Social Network Epidemic Data Collector. INForum informatics symposium.
<b>Source</b>	<a href="http://epiwork.di.fc.ul.pt/collector/">http://epiwork.di.fc.ul.pt/collector/</a>
<b>Coverage</b>	Spatial: Portugal, Temporal: 2009-5-16 to 2009-6-3
<b>Rights</b>	Creative Commons Attribution-ShareAlike (CC BY-SA), <a href="http://creativecommons.org/licenses/by-sa/3.0/">http://creativecommons.org/licenses/by-sa/3.0/</a>

**Initial Graphic  
Style  
Consortium use only**

# Epidemic Marketplace

// Epidemic Marketplace

// Datasets

// Forum

// Web Services

// Data Collection

// Contact

// Learn More

## Epidemic Marketplace

... a platform for integrating and sharing epidemiological data.

**V1.0 Graphic Style  
Public in 2nd year**

Some features of the Epidemic Marketplace require user authentication. Please [register](#)

Datasets

Forum

Web Services

Data Collection

**Announcements**

2010.10.01 // Epimarketplace.net is now open to user registrations from the entire community. [\(See More\)](#)

[Browse](#)[Upload](#)[Request](#)

## Latest Announcement

### New upload

The new upload is now available at [v2.epimarketplace.net/newupload](http://v2.epimarketplace.net/newupload)

[See More](#)

## Advanced Search

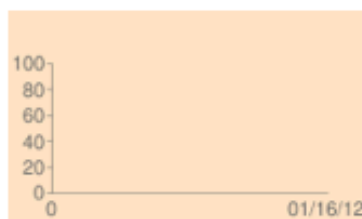
### [Become a Curator](#)

A curator is a user that has some administrative permissions over the Epidemic Marketplace website. [See more](#)

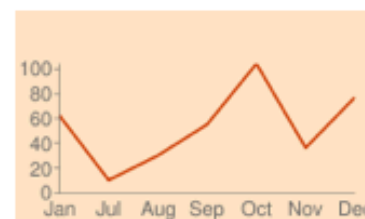
### [Developers Corner](#)

You can access to our Web Services, Tools, Manuals and Significance. [See more](#)

### 100 Resources

[See More](#)

### 379 Visitors

[See More](#)[Recent Requests](#) (0)[Popular Requests](#) (0)[Recent Uploads](#) (0)

## Website Tour

## Most visited documents of the week

### [Epi Info](#)

Luis Filipe Lopes

2010-09-17

Epi Info™ and a personal computer, epid ...

Subject: epidemic  
Type: Software

[See more](#)

### [cumEl Salvador](#)

Daniela Paolotti

2010-06-10

Subject: epidemic  
Type: Dataset

[See more](#)





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In 2009 there were 14,346 fatal cases of swine flu,  
**we stored the data**

Examples: Epidemic, flu, h1n1

Search

Advanced ►

### Latest resources



Mobility data

Seasonal transmission potential and activity peaks of the new influenza A(H1N1): Supporting Data

by Francisco Couto on 2013-05-15

Epidemiology



Event

Workshop on Digital Epidemiology

by Francisco Couto on 2013-05-15

Epidemiology



Epidemiological  
data

HCoV-EMC infection in Calu-3 cells: Supporting data

by Francisco Couto on 2013-05-15

Epidemiology

### Latest requests



Request for flu information

✓ Epidemiology

Announced at 4<sup>th</sup> meeting  
Try it at:  
Epimarketplace.net

Request for additional data

✓ Epidemiology

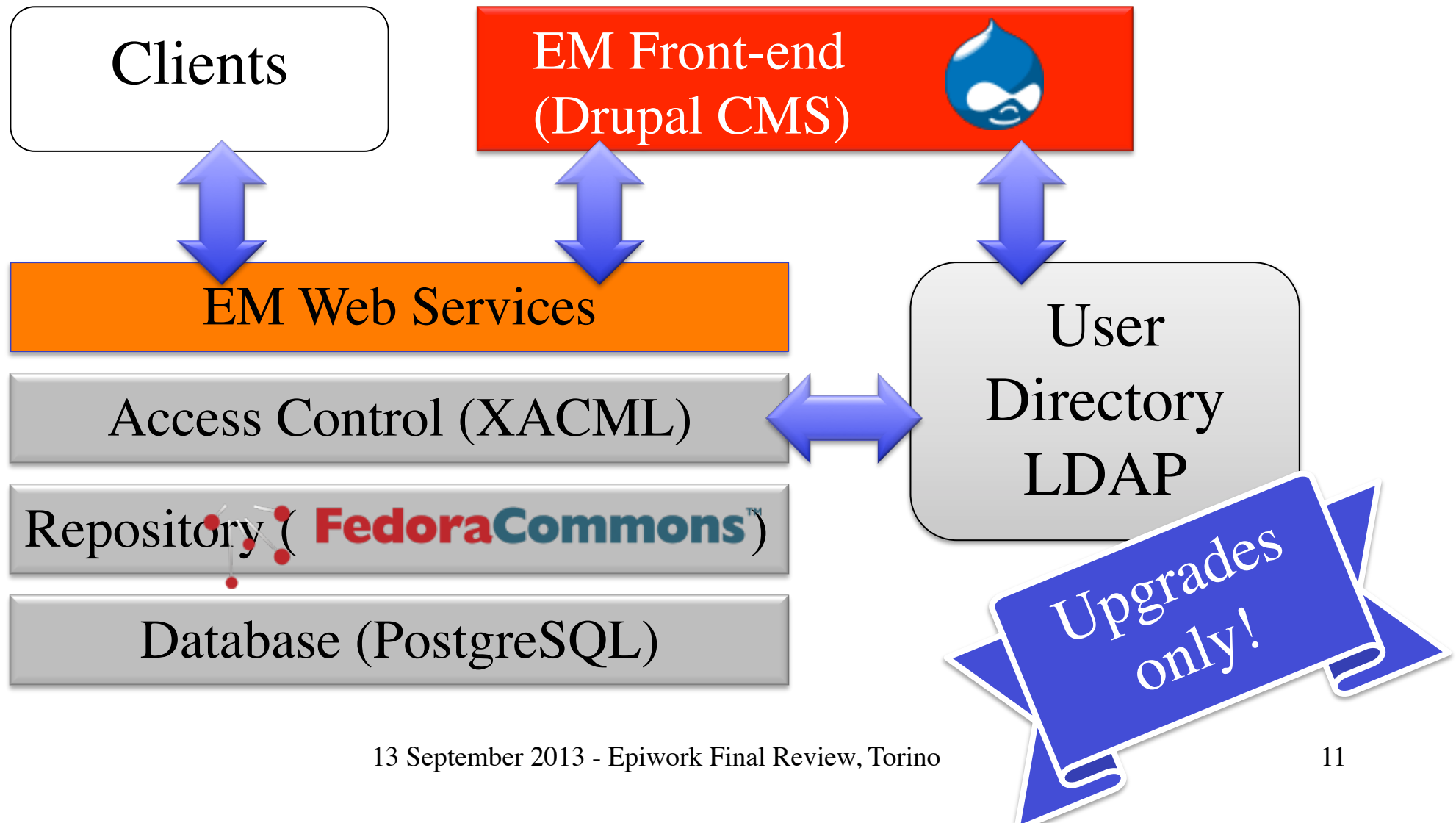


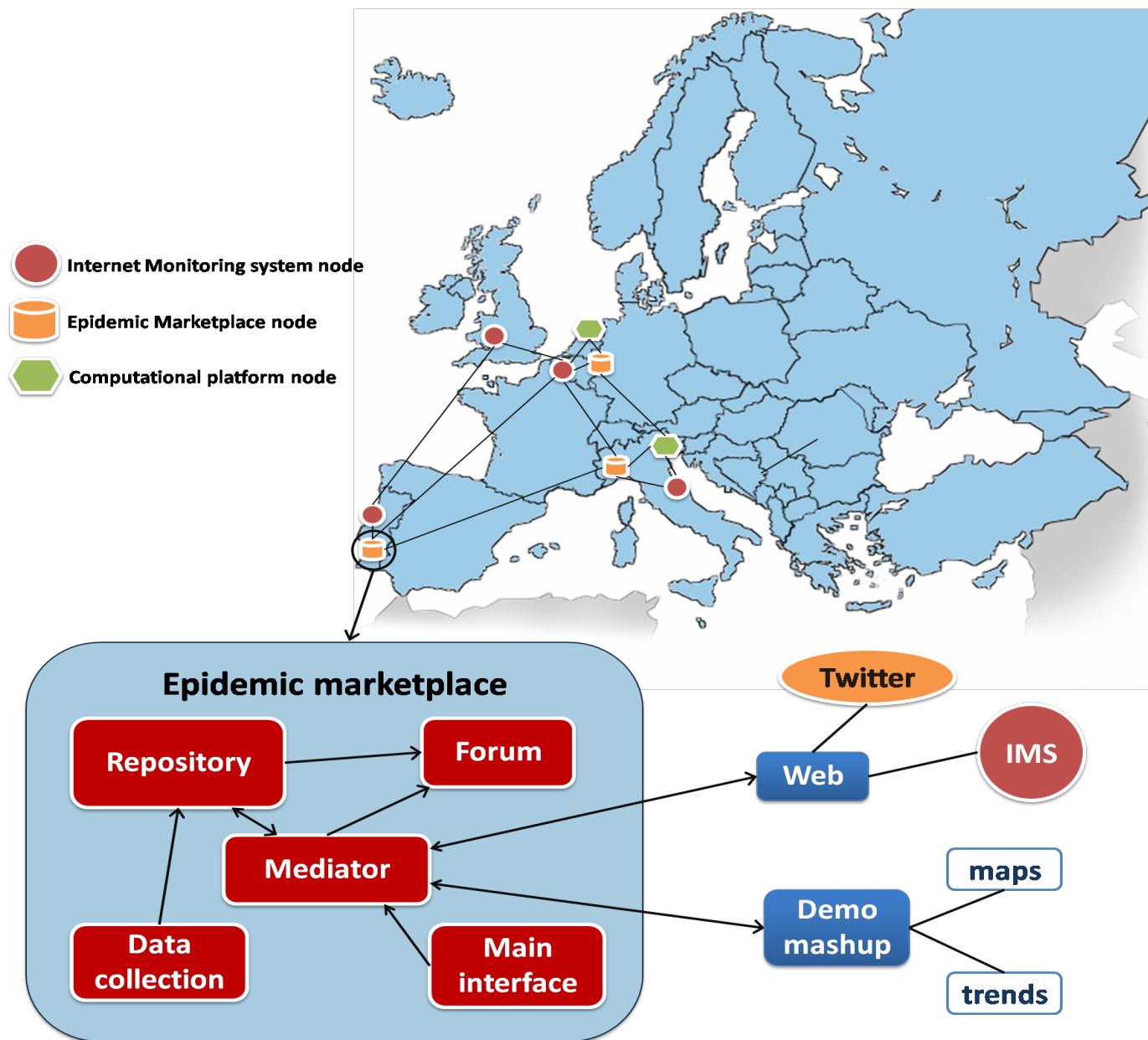
epidemic  
marketplace

## EM 3.0 Front-End

- Focus on usability and design
- Much Improved annotation interface
  - Support for manual/automatic annotation
- Curator portal: gone
  - The “collection” metaphor is enough

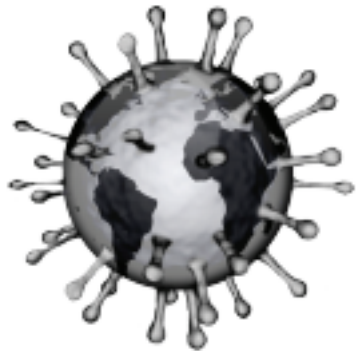
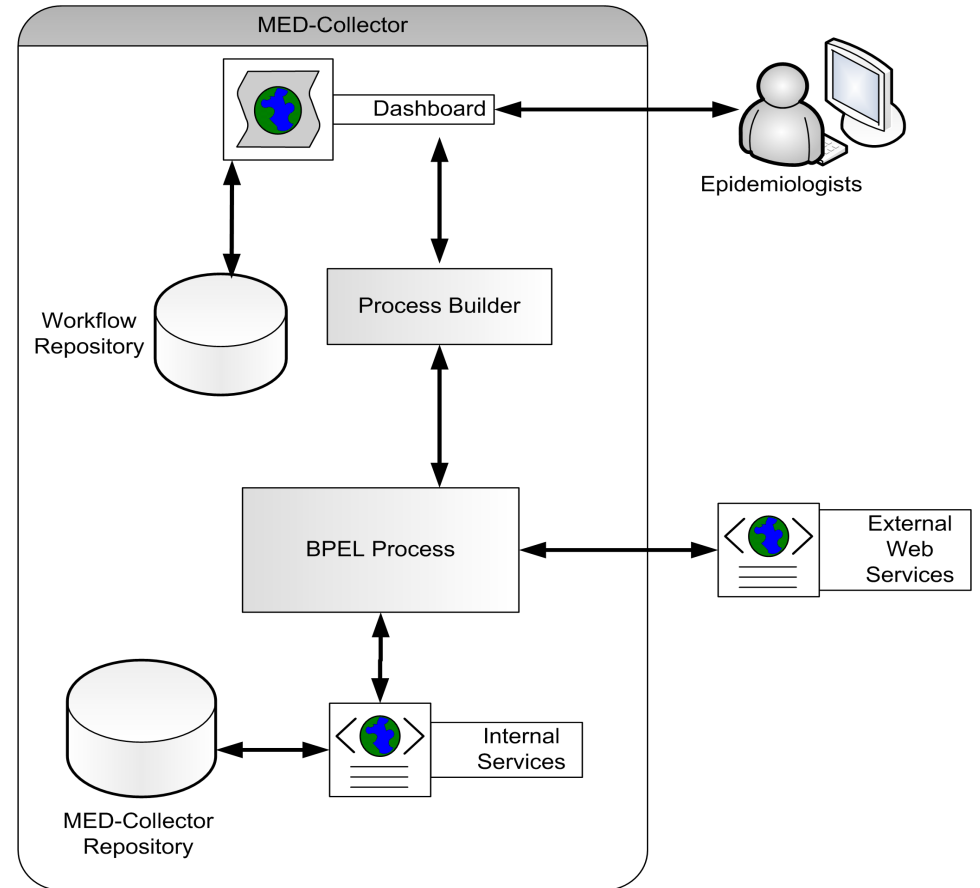
# Software Components





# EM Clients

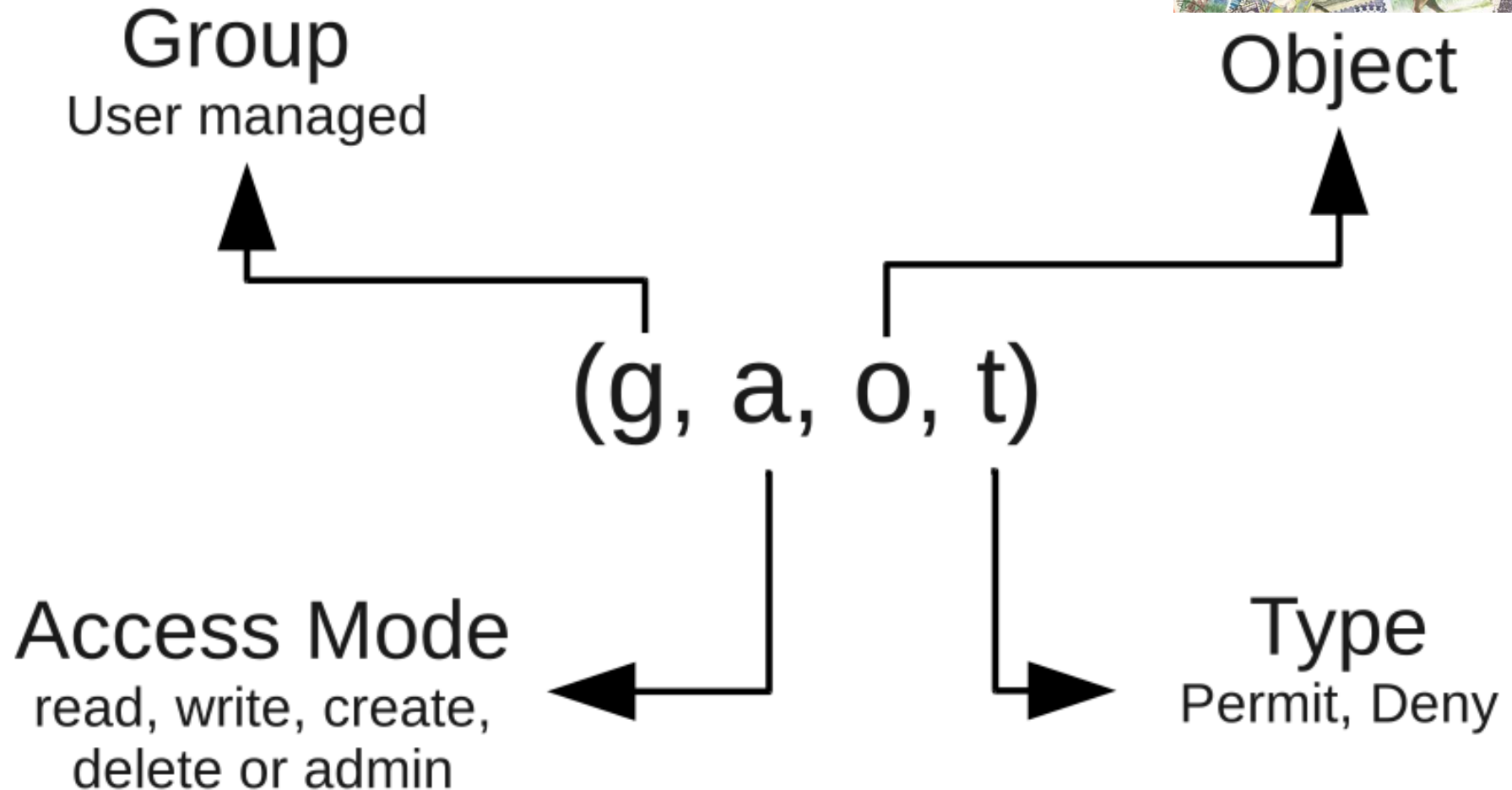
- MedCollector
- GleanViz



GLEaMviz Simulator  
GLEaMviz.org



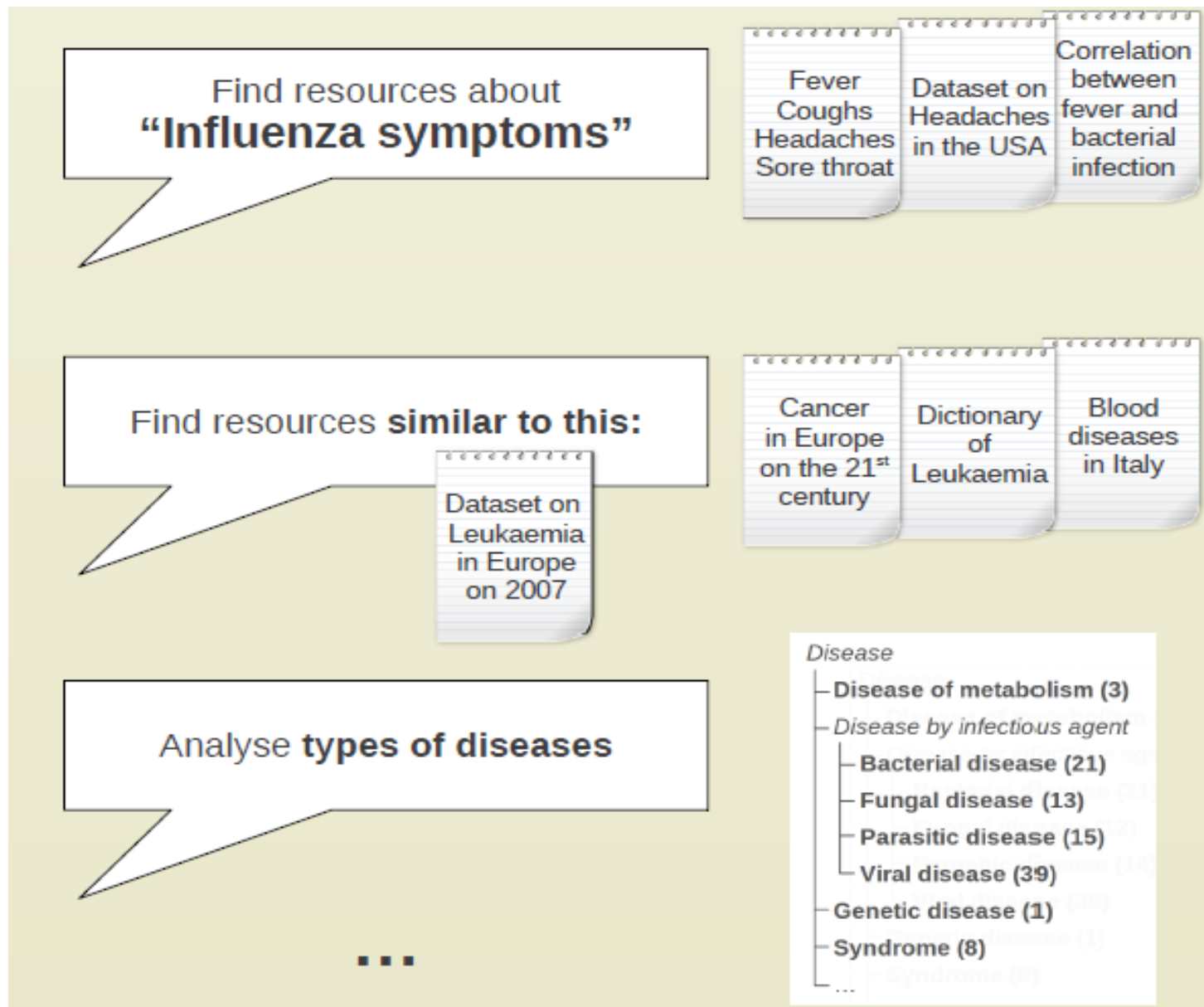
# Access Control Model





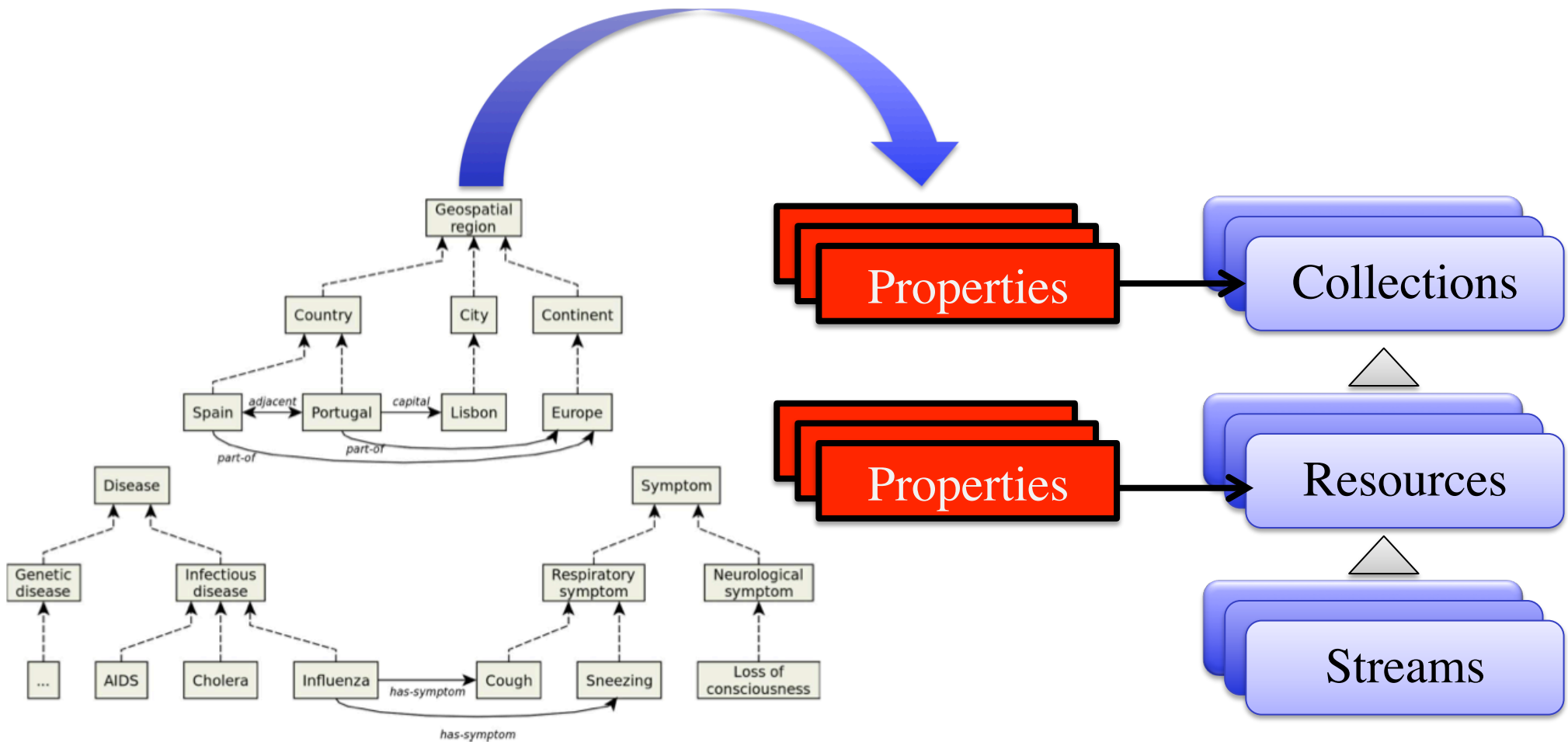
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# ONTOLOGIES IN THE EM



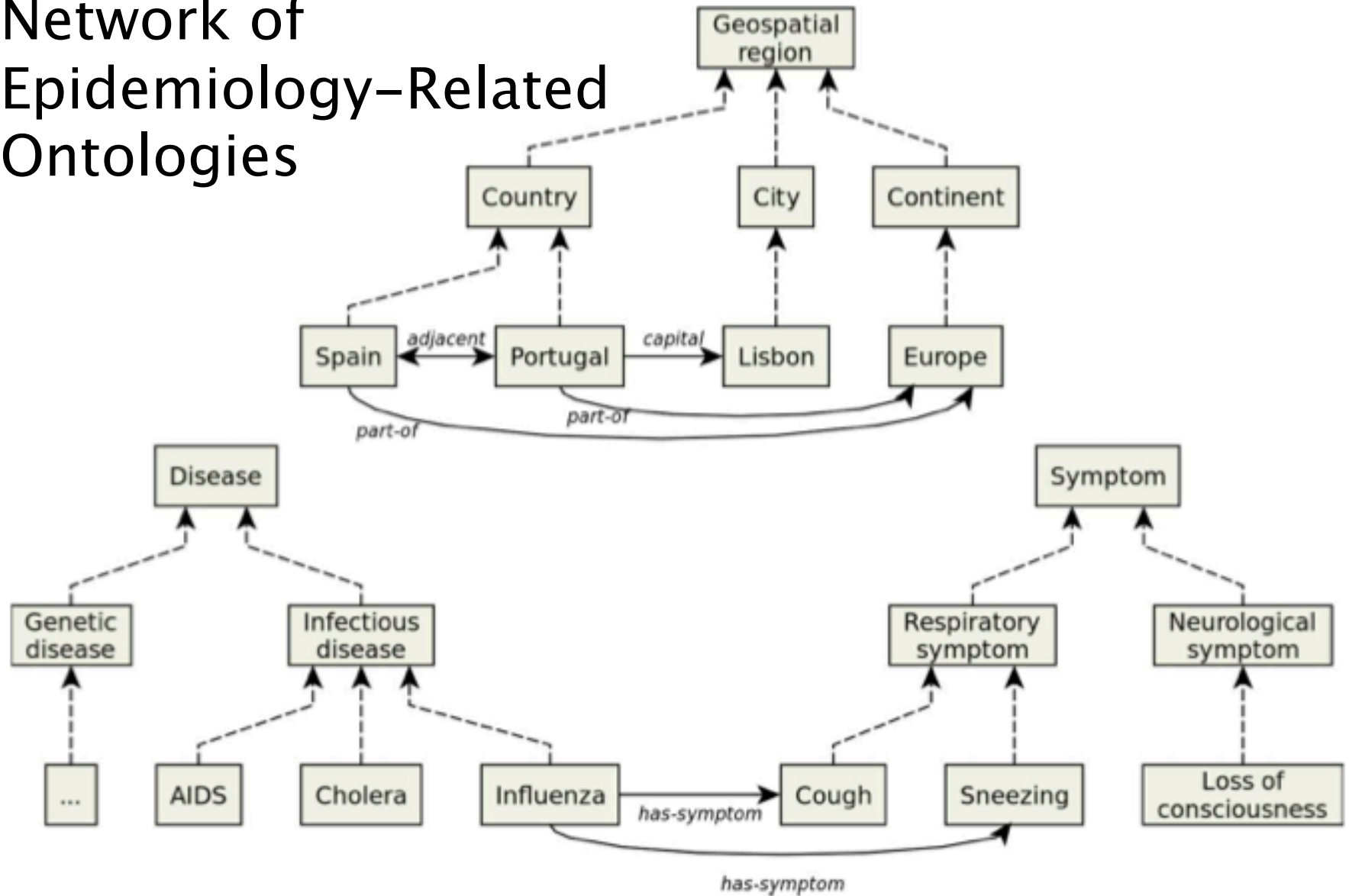


# Which Ontology Terms?

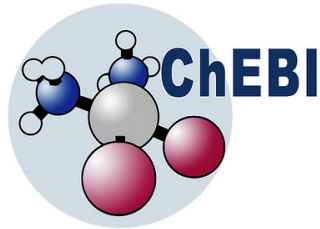


# NERO

## Network of Epidemiology–Related Ontologies



# Selected Ontologies



The Open Biological and Biomedical Ontologies

**MeSH** used to index articles in biomedical sciences (**general domain**)

**GeoPlanet™** representation of the world **geography**

**ENVO** ontology for the **environment** domain

**TRANS** describes **transmission** of a pathogen from one host to another host

**ChEBI** ontology of **chemical compounds** focussed on biologically relevant entities



Upload resource	
Title:	Influenza in France
Description:	Containes data collected by an organisation
Disease:	Influenza
Host:	Human
Transmission:	Airborne
Environment:	Temperature, Humidity
Location:	France
Demography:	School years
...	

Resource:

## Edit "Infections, medication use, and the prevalence of symptoms of asthma, rhinitis, and eczema in childhood.":

The Pre-load feature is based on [BioPortal Annotator](#) tool and NERO ontologies.

**Note:** you will have to submit changes after the pre-loading.

Pre-load

### Biological Information

#### Diagnostic Method

Diagnostic test used to obtain data in the resource; or the protocol defined in the resource

#### Disease

Disease that is mentioned in the contents of the resource

#### Symptom

Symptom that is mentioned in the contents of the resource

#### Drug

Chemical compounds associated with in the resource, as cause and/or treatment of a disease

### Other available actions

[Title and description](#)[General information](#)[Time and location](#)[Epidemiological information](#)[Authors](#)[Source information](#)[Bibliographic references](#)[External identifiers](#)[Resource's rights](#)[Upload file](#)[Edit Urls](#)[VIEW RESOURCE ►](#)

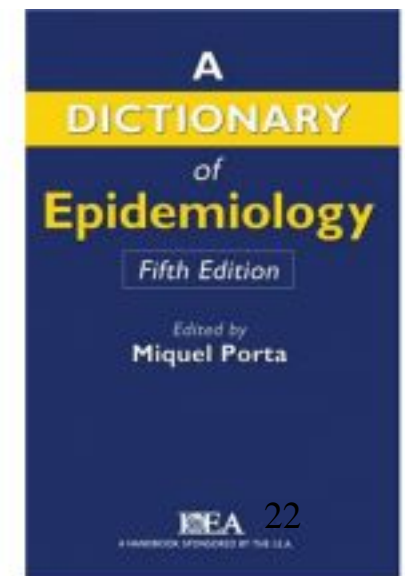
Set a relationship with  
this resource

[← Pick resources](#)

# Idea: Semantification of the Dictionary of Epidemiology

**DISEASE MODEL** - Quantitative simulation of the natural history of a disease (incidence, progression, prognosis, etc.) using epidemiological data. A public health model is population-based, whereas a clinical model is patient care.

- 
- Not so much a good idea after all



# The Epidemiology Ontology (EO)

- **BASED** on the Dictionary of Epidemiology
- Focused on **Transmission**
  - OBO Foundry is welcoming

<https://code.google.com/p/epidemiology-ontology/>

The OWL file:

<http://tinyurl.com/mpyukn7>



Epidemiology-  
related ontologies

“Foreign” epidemic  
resources

*feedback*

**NERO**

*applied on*

*feedback*

*applied on*



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HEY, HOLD ON!!!

**HOW GOOD ARE THESE  
ONTOLOGY-BASED  
CHARACTERIZATIONS?**

**IS ANYBODY ACTUALLY  
SHARING COLLECTED DATA?**





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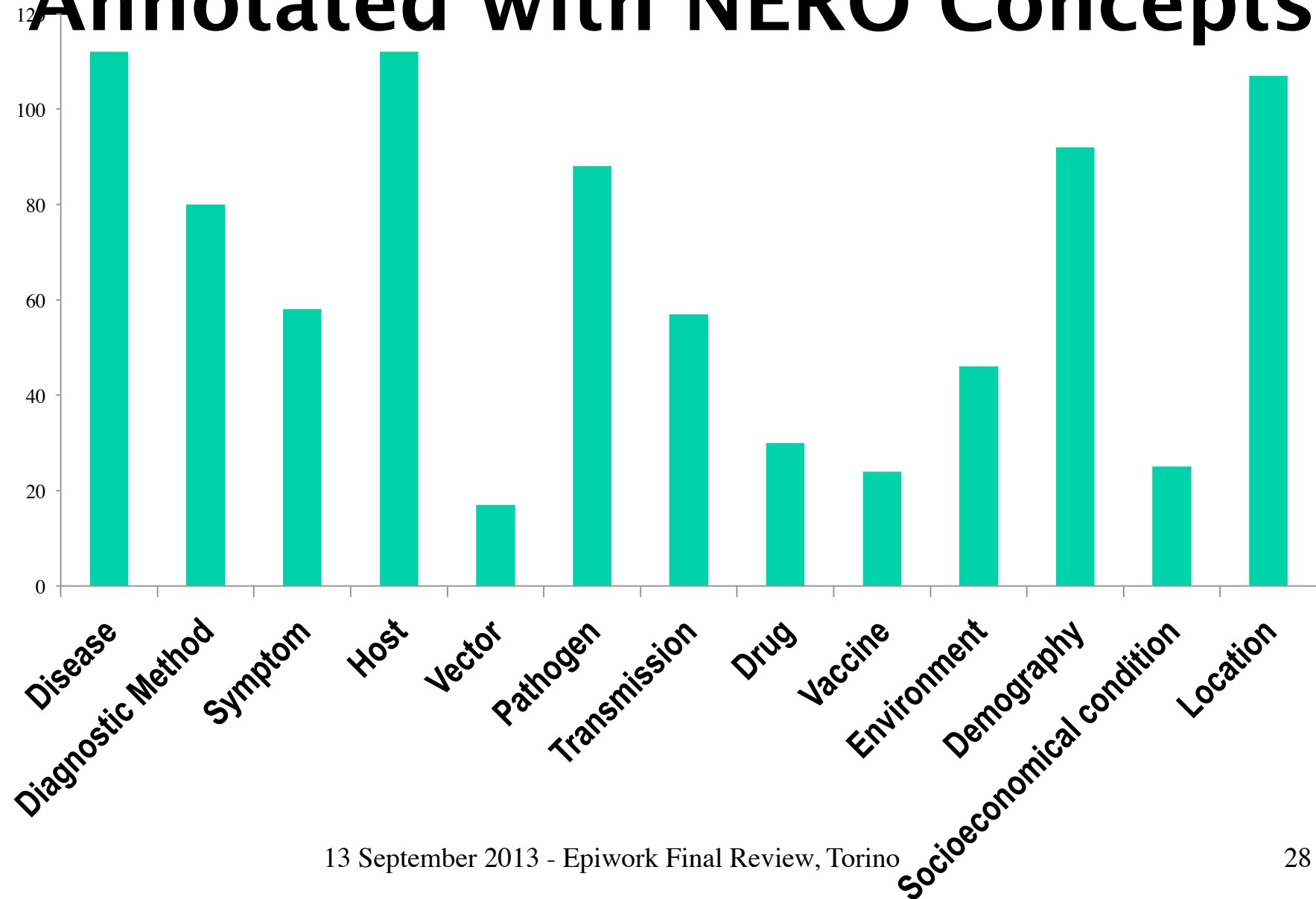
# EUROSURVEILLANCE STUDY



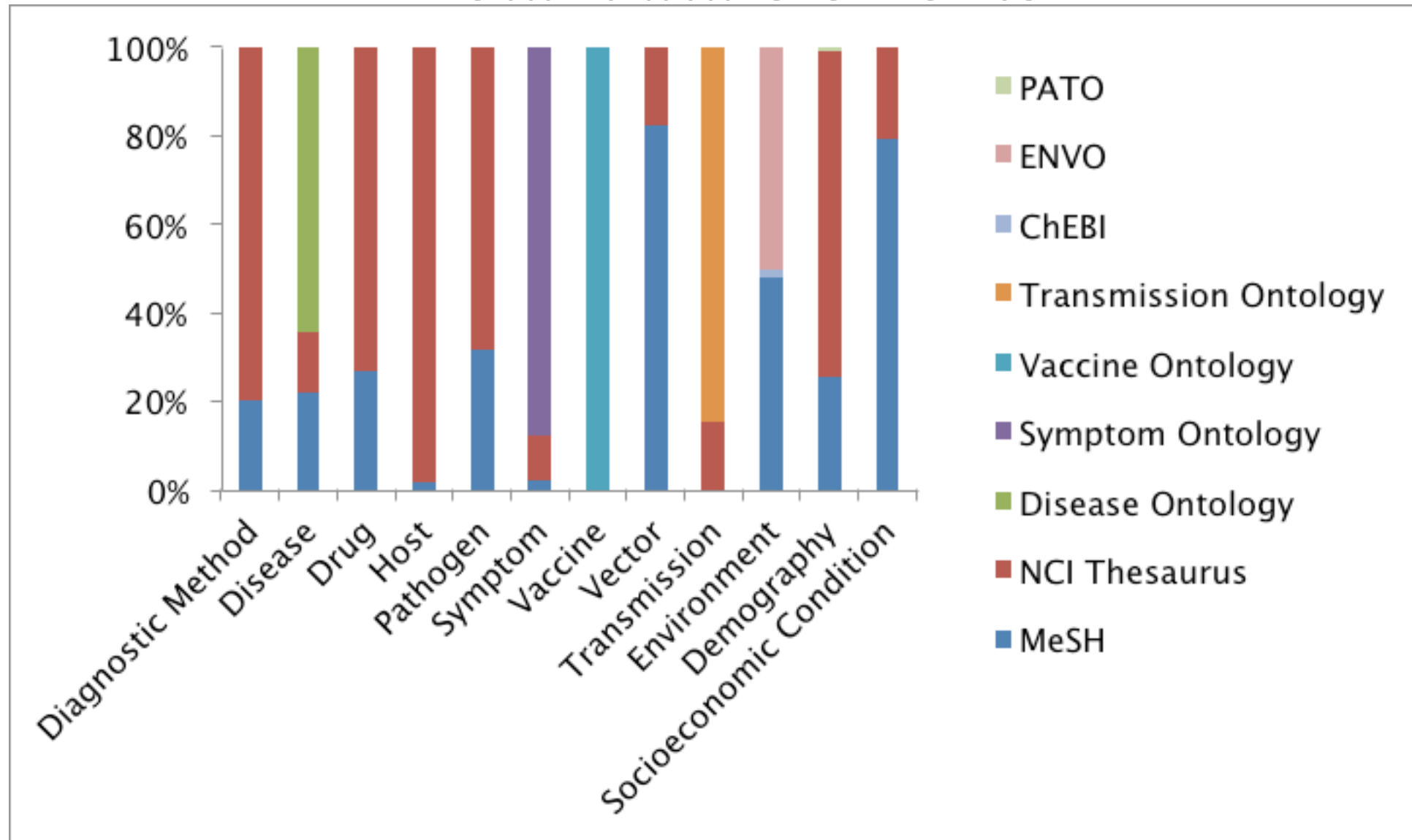
# Eurosurveillance + JECH Study

- Eurosurveillance: all (78) papers published between October 13, 2011 and August 16, 2012.
- JECH: 2005 to 2011, 34 papers.
- **112 publications.**
- All datasets and corresponding papers fully characterized in the Epidemic Marketplace

# # Papers Annotated with NERO Concepts



# Distribution of Ontology Terms in meta-data elements



# Eurosurveillance Study: Conclusions

1. 112 datasets and ...  
**none available from a repository**
2. Having the datasets in public repositories, like the EM, would stimulate production of epidemic data as **linked open data** and enable **meta-analyses** in epidemiology
3. Textual descriptions **provide the necessary information** for reasonably complete characterization of datasets with NERO.
4. **Incentive\$** are needed to promote the production of structured metadata characterizing epidemic datasets.





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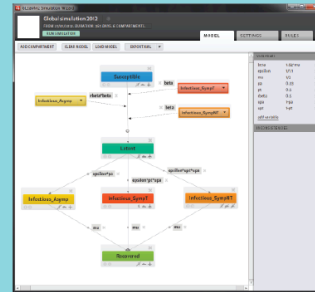
# INTEGRATION



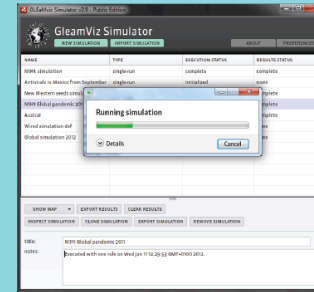
Visiting User



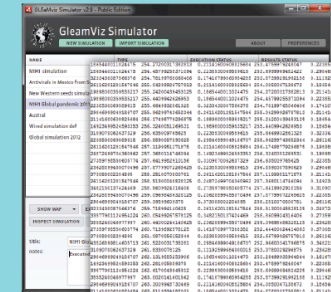
Epidemiologist



1. Design a new simulation



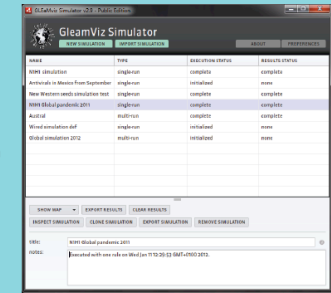
2. Run the simulation



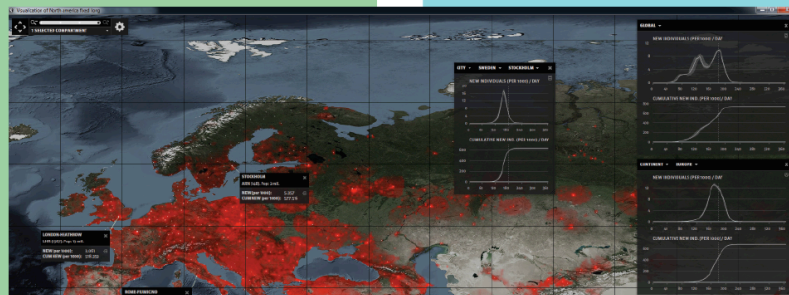
3. Get the output



1. Browse the epidemic marketplace



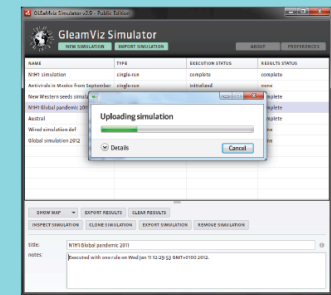
4. Browse the epidemic marketplace



2. Explore the results



6. Share the simulation



5. Upload the simulation

7. Explore the results

# WP2 Integration



Search for... **Search** Advanced ►

Resource:

## Synthetic contact matrices for Europe



uploaded by **Marco Ajelli** on 2013-05-30

Epidemiological data

0 0 4

Contact matrices by 1-year age brackets are available for 26 European countries, namely Austria, Bulgaria, Switzerland, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, The Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Sweden, Cyprus.

File M.xls contains country-specific total matrices of adequate contacts by age.

File HSWR.xls contains setting-specific matrices of adequate contacts (household, school, workplace, general community).

In files M-symm.xls and HSWR-symm.xls there are the symmetric versions of total and setting-specific contact matrices, respectively.

### PREVIEW

Unsupported format type for previewing

### Uploader



**Marco Ajelli**

Organisation:  
FBK

URL:  
<http://www.fbk.eu>

Contact

### Tags

Demography Epidemiology

### License



To the extent possible under law, the person who associated CC0 with this work has waived all copyright and related or neighboring rights to this work.



# WP5 Integration



Filter by

## Disease

Influenza (11)

## Country

Belgium (3)

Italy (3)

Netherlands (3)

Portugal (3)

Spain (1)

France (1)

United Kingdom (1)

Sweden (1)

UK (1)

Search

The screenshot shows the Influenzanet website interface. At the top, there's a header with the 'Influenzanet' logo and a 'Show/Hide Influenzanet map' link. Below the header is a map of Europe with flags indicating participating countries: Belgium, France, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and United Kingdom. A text box below the map states: 'Currently 41267 volunteers from 9 participating countries are contributing to Influenzanet: Belgium France Ireland Italy Netherlands Portugal Spain Sweden United Kingdom'. There's a 'Hide map' link. Below the map is a navigation bar with links: Home, News, Results, Method, Data, Publications, Contact. To the right of the navigation bar is a search bar with a 'Search' button. Below the navigation bar is a 'Latest news' section with a red header and the title 'Influenzanet'. To the right of the 'Latest news' section is the 'EPIWORK' logo.

influenzanet

Examples: Epidemic, flu, h1n1

Search

Advanced ►

Order by: Title Uploader Date

11 results found



Epidemiological  
data

## Influenzanet Estimated Incidences for UK in 2012

by João Miguel Quintino de Moraes Zamite on 2013-01-30

Influenzanet is a system to monitor the activity of influenza-like-illness (ILI) with the aid of volunteers via the internet. These are the results of this survey for the country UK and the period 2012.

Epidemiology



Organisation

## Influenzanet

by Luis Filipe Lopes on 2010-02-09

Epidemiology



# DISSEMINATION

# Events – 4<sup>th</sup> Period

- Participation in SemEval 2013
  - Recognition of drug names using ChEBI (one of NERO's ontologies)
  - Best (macro-averaged) F1 in the MEDLINE test dataset annotation



- ICBO 2012
  - 1 paper
  - Demoed the EM and NERO annotator



- Bioinformatics Open Days 2012. Braga, Portugal. Poster

# Publications – 4<sup>th</sup> Period (1)

1. João Zamite, Dulce Domingos, Mário J. Silva, Carlos Santos. Group-Based Discretionary Access Control for Epidemiological Resources. **HCist'2013 - International Conference on Health and Social Care Information Systems and Technologies**. To be published on Procedia Technology, Elsevier. October 2013.
2. Catia Pesquita, João Ferreira, Vera Carvalho, Francisco M Couto, Mário J Silva. Epidemiological resource identifiers and their semantics, where are they? **Submitted to PLOS One**, June 2013.
3. Catia Pesquita, João D. Ferreira, Francisco M. Couto, Mário J. Silva. The Epidemiology Ontology: an ontology for the semantic annotation of epidemiology resources. **Submitted to JBMS Special Issue on Ontology**, May 2013.
4. Tiago Grego, Francisco M. Couto 2013: Enhancement of Chemical Entity Identification in Text Using Semantic Similarity Validation. **PLOS ONE** 5(8), e62984.
5. João Ferreira, Daniela Paolotti, Francisco Couto, Mário J. Silva 2012: On the usefulness of ontologies in epidemiologic research and practice. **Journal of Epidemiology and Community Health**.

# Publications – 4<sup>th</sup> Period (2)

6. Catia Pesquita, Francisco M. Couto 2012: Predicting the Extension of Biomedical Ontologies. **PLOS Computational Biology** 9(8), e1002630.
7. Francisco M. Couto, João D. Ferreira, João Zamite, Carlos Santos, Tiago Posse, Paulo Graça, Dulce Domingos, Mário J. Silva, The Epidemic Marketplace Platform: towards semantic characterization of epidemiological resources using biomedical ontologies. International Conference on Biomedical Ontologies (ICBO) 2012.
8. João D. Ferreira, Catia Pesquita, Francisco M. Couto, Mário J. Silva, Bringing epidemiology into the Semantic Web. International Conference on Biomedical Ontologies (ICBO) 2012.



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# TEAM & PLANS

# FFCUL Team on WP3

- Mário J. Silva, Dulce Domingos, Francisco Couto, Cátia Pesquita
  - João Zamite, João Ferreira, Paulo Graça.
  - Tiago Posse, Carlos Sousa
- +
- Vera Carvalho, Hugo Santos (3 months)

# Plans

- Epidemic Marketplace as part of an ESFRI
- Basis for H2020 supported RI?
  - Jointly with the Computational Platform, make it the basis for a **Virtual Research Environment on Epidemic Modeling**
- Seek helpers for Building Community





**epidemic**  
marketplace

www.epimarketplace.net

In 2009 there were 14,346 fatal cases of swine flu,  
**we stored the data**

Examples: Epidemic, flu, h1n1

Search

Advanced ►

## Latest resources



Mobility data

Seasonal transmission potential and activity peaks of the new influenza A(H1N1): Supporting Data

by Francisco Couto on 2013-05-15

Epidemiology



Event

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Epidemiology



Epidemiological  
data

HCoV-EMC infection in Calu-3 cells: Supporting data

by Francisco Couto on 2013-05-15

Epidemiology

## Latest requests



Request for flu information in Brasil

✓ Epidemiology



medcollector datasets

✓ Epidemiology



Data describing the population's infection network structure

✓ Epidemiology



Requesting additional data

✓ Epidemiology

13 September 2013 - Epiwork Final Review, Torino

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